NEOTROPICAL DRYOPOIDS. III. NEW RECORDS OF *XENELMIS*, WITH A DESCRIPTION OF THE LARVA (COLEOPTERA: ELMIDAE).

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Abstract

A total of 544 adults of *Xenelmis* are reported from Mexico: states of Chiapas, Colima, Guerrero, Jalisco, and Morelos; Guatemala: Dept. of Guatemala, Jutiapa, Retalhuleu, and Suchitepequez; Nicaragua: Dept. of Granada; Costa Rica: Dept. of Puntarenas; Panama: Prov. of Chiriquí, Coclé, and Panamá; Venezuela: states of Carabobo and Cojedes. A total of 203 larvae were collected from 10 localities in Mexico, 2 in Panamá, and 1 in Venezuela, either in association with adults or near sites where adults were found. The mature larva of *X. bufo* (Sharp) is described and figured, generic characteristics are outlined, and instructions are given for inclusion of *Xenelmis* in Bertrand's and Hinton's keys to larval elmids. Larvae and adults occur in sandy or gravelly streams.

Introduction

Of the genera of elmids known from North America (including Mexico), the larvae of only 2 remain unknown: *Atractelmis* Chandler from California and *Xenelmis* Hinton from Mexico and southward. *Atractelmis* is apparently rare, being known from very few specimens taken in a couple of localities. Although I have sought *Atractelmis*, I have succeeded in collecting only one adult (a female, from the type locality at Wawona in Yosemite National Park) and no larvae. *Xenelmis*, on the other hand, is relatively common and widespread, ranging from central Mexico through much of South America. I have collected 550 adults and 203 larvae which are almost certainly those of *Xenelmis*. These larvae are from 10 localities in Mexico, 2 in Panama, and 1 in Venezuela. In 10 of the 13 localities, adults of *Xenelmis* were found in association with the larvae; in the other 3 sites, adults of *Xenelmis* were located on the same date within a few miles of the larval collecting sites. The larvae are of appropriate dimensions and aspect to yield adult *Xenelmis*. In no case was any other genus found with which the larva might be associated, although as many as 13 other genera of dryopoids were present in the same locality. Thus, in spite of the absence of proof through rearing, there is little doubt that the larva here described is that of *Xenelmis*. Furthermore, since the adults in all of the localities concerned appear to be *X. bufo* (Sharp) 1882, the larvae probably represent this species. Identification is based on Hinton's key (1946). The nearest region from which Hinton (1940, 1946) cited any other species was the Amazon basin of Brazil. The only subsequent records of *Xenelmis* are those of Delève (1968), who described a species from Ecuador, and Brown (1970), who described one from the State of Pará, Brazil.

Generic Characters of the Larva of *XENELMIS*

Body convex, broadly rounded anteriorly, tapering posteriorly from second abdominal segment; hemispheric in cross-section (Fig. 1-3).

Head usually concealed by pronotum when viewed dorsally, although it can be extended from beneath pronotum; anterior margin without tooth

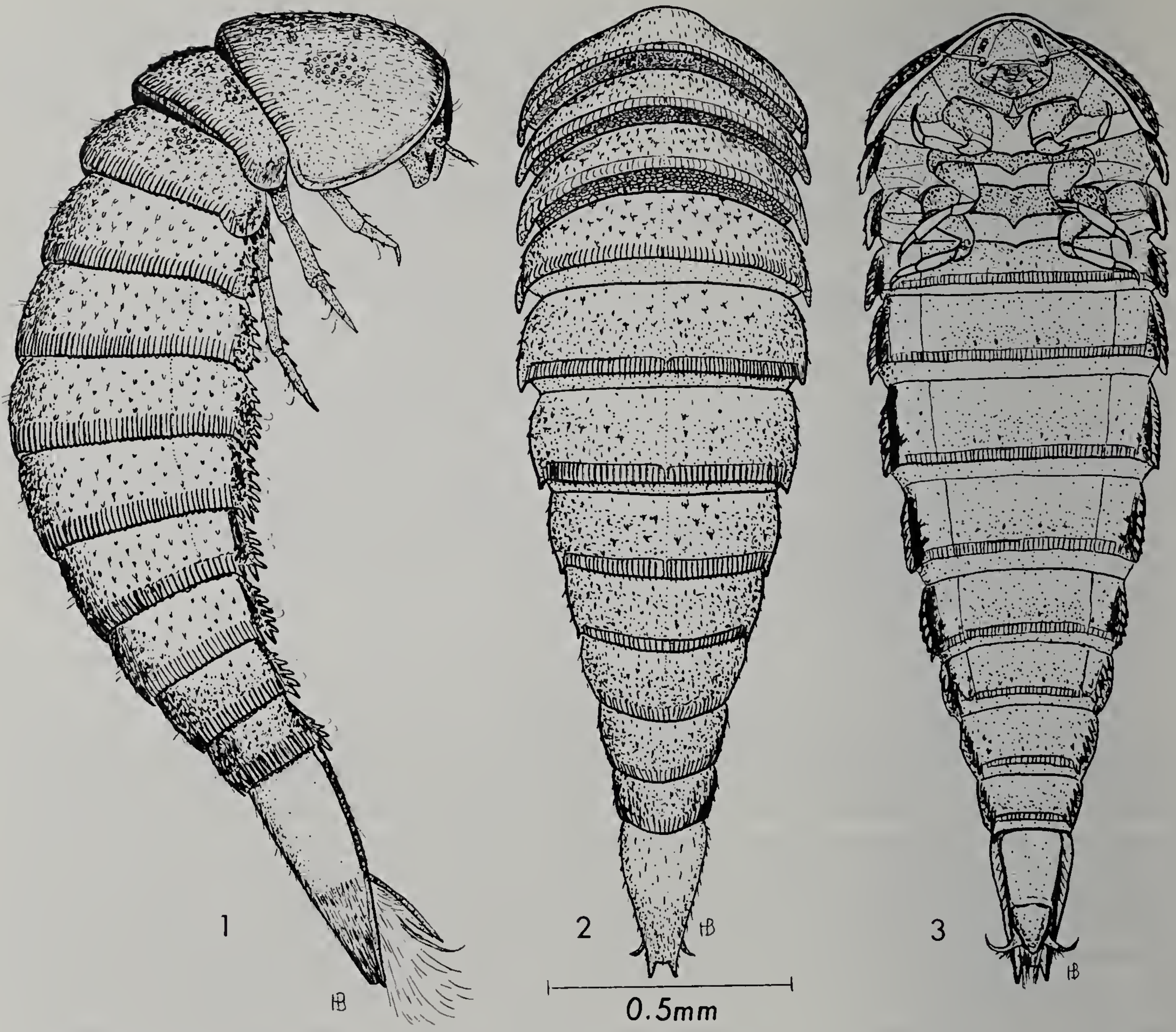

Fig. 1-3: *Xenelmis bufo* larva; 1) lateral aspect, 2) dorsal aspect, 3) ventral aspect.

between base of antenna and clypeus (Fig. 4). Each eye with 5 (?) ocelli in a compact group. Antennae 3-segmented. Mandibles of both sides similar and with 3 rather obtuse apical teeth; prostheca slender and densely setose (Fig. 5). Maxillary palp 4-segmented, the basal segment very short and inconspicuous; stipes showing no differentiation into a palpifer; galea and lacinia separate, each spinose apically (Fig. 6). Labium with postmentum undivided; labial palp 3-segmented and prementum without a distinct palpiger. Gula well developed.

Prothoracic pleura divided into 2 parts, the anterior parts of the 2 sides barely meeting midventrally; procoxal cavities open posteriorly, partially separated in the middle by a small median sclerite (Fig. 3). Meso- and metapleura divided into 3 parts.

Abdominal segments 1-6 with pleura bounded by tergo- and sternopleural sutures; these sutures converging but not quite meeting at apex of sixth segment. Segments 7 and 8 without pleura, but apparently with tergosternal sutures. Operculum with 2 well-sclerotized claws attached to its dorsal membrane. Apex of ninth segment deeply and acutely emarginate. Lateral margins of abdominal segments produced posteriorly and heavily spined. Spiracles present on mesothorax and first 8 abdominal segments, opening laterally. Tracheae without air sacs.

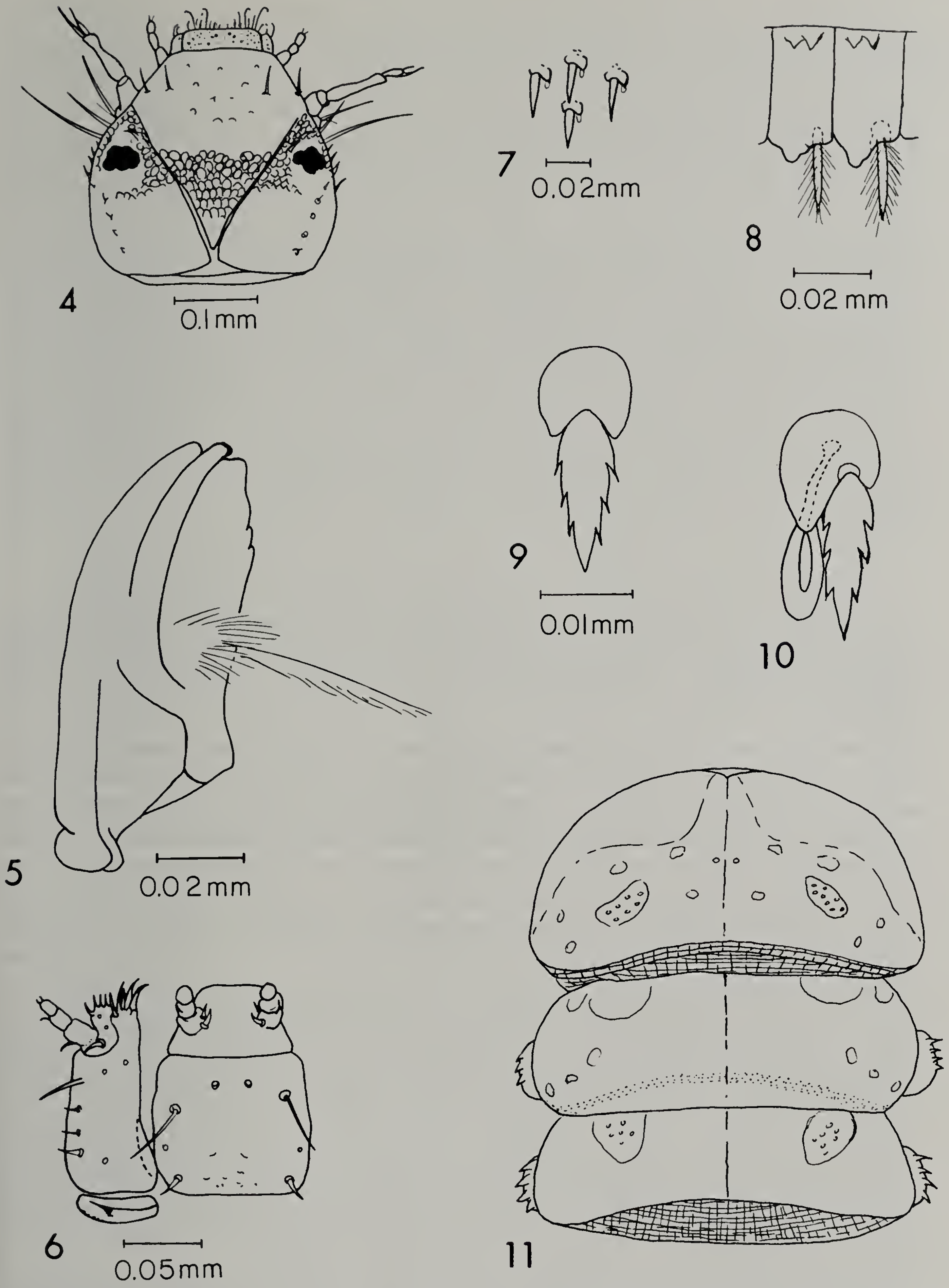

Fig. 4-11: *Xenelmis bufo* larva; 4) dorsal aspect of head, 5) left mandible, 6) right maxilla and labium, 7) tubercles and setae from first abdominal tergite just to the right of mid-dorsal line, 8) scale-like tubercles and delicate plumose hairs which form the posterior margin of third abdominal tergite just to the left of mid-dorsal line, 9) tubercle and serrate seta from fifth abdominal sternite, 10) tubercle with serrate seta and "bladder" from fifth abdominal left pleurite, 11) dorsal aspect of thorax showing patches devoid of setae.

The larvae of *Xenelmis* do not seem very close to those of any other genera known from the Western Hempisphere. In general appearance, they are reminiscent of the larvae of the European *Elmis*, being somewhat onisciform. Of New World forms, they are perhaps closest to larvae of *Macronychus*, with which they share such characters as possession of only 6 pairs of abdominal pleura, bipartite propleura, procoxal cavities open posteriorly, and apex of ninth abdominal segment emarginate. From the larvae of *Macronychus* they differ in possessing tripartite meso- and metapleura, a more convex body, and prominent spines along the lateral margins of the abdominal segments. The larvae of *Macronychus* occur on and feed on wood, as do the adults, whereas the larvae and adults of *Xenelmis* occur in sand or gravel in riffles. Ecologically, they are similar to the larvae of *Optioservus* and *Oulimnius* (formerly known as *Limnius*), which they also resemble in general aspect and in having open procoxal cavities. *Xenelmis* larvae differ from them in many respects, including the possession of only 6 abdominal pleura, bipartite instead of tripartite propleura, and tripartite instead of mono- or bipartite meso- and metapleura.

DESCRIPTION OF MATURE LARVA OF *XENELMIS BUFO* (SHARP)

Length 2.7mm, width 0.7mm. Body hemispheric in cross section. Thoracic segments and first 2 abdominal segments subequal in width, the remaining abdominal segments tapering conspicuously toward apex (Fig. 1-3).

Head brown above, testaceous below and on sides. Body generally ashy brown above except antero-lateral portions of pronotum, first abdominal segment, and anterior half of ninth abdominal segment, all of which are testaceous. Posterior margins of all segments with a darker border. Legs and ventral sclerites of thorax pale, dusky, and translucent. Sternites and pleurites of first 8 abdominal segments also pale, dusky, and translucent. Ventral surface of ninth abdominal segment testaceous, shading toward brown apically, the operculum light brown. In some specimens the first abdominal tergite is as dark as the remaining ones; in others (perhaps recently molted) the dorsal thoracic and first 6 abdominal segments are almost uniformly testaceous. Intersegmental membranes dark above, armored with a fine reticulum of minute plates; ventral intersegmental membranes lighter in color, generally a pale gray to testaceous.

Dorsal sclerites rather sparsely covered with small, most bidentate tubercles, each of which gives rise to a stout seta and a small, delicate, bladder-like process (Fig. 7). Posterior margins of first 8 abdominal tergites bordered by a close-set row of elongate, flattened, apically dentate tubercles, each bearing a delicate plumose hair (Fig. 8).

Head capsule broadly rounded and truncate behind. Region around and between eyes densely covered with small, scale-like tubercles (Fig. 4); a few scattered flattened tubercles across frons. Setal pattern as shown. Frontal sutures well developed and extending on each side from base of antenna to unite medially just ahead of posterior margin. Ocelli conspicuous. Labrum transverse; anterior margin truncate, anterior angles abruptly rounded; bordered by pale, slender setae, some of which are recurved. Mandibles each with 3 obtuse apical teeth and a slender, setose prostheca (Fig. 5). Maxilla with palp 4-segmented, the basal segment very short and sometimes difficult to detect; galea and lacinia subequal in size and densely spinose at apex, the lacinia more heavily sclerotized and with no joint or suture (Fig. 6). Labium with mentum quadrate, about as long as broad; prementum tapering apically, with apical angles broadly rounded and apical margin truncate; labial palps short, plump, and 3-segmented (Fig. 6).

Pronotum about twice as broad as long, narrowed anteriorly, with rounded angles; broadly convex; on each side near basal two-fifths and halfway between midline and lateral border with a semilunar patch devoid of setae and bearing flattened tubercles, and other similar smaller patches as shown in Fig. 1 and 11. Mesonotum about 3 times as wide as long; lateral margin slightly and roundly produced posteriorly, with several small marginal spines; on each side with patches devoid of setae as shown in Fig. 11. Metanotum slightly more than 3 times as wide as long; lateral margin roundly produced posteriorly, with about 5 prominent marginal spines; on each side with an inconspicuous patch devoid of setae bordering the anterior margin about half way between midline and lateral margin.

First 2 abdominal segments subequal in width to thorax, the third a little narrower, and the remaining segments progressively narrower (Fig. 2, 3). First abdominal segment usually lighter in color than thoracic segments and the other abdominal segments. Tergites of abdominal segments 1-8 bordered posteriorly with a row of flattened, elongate, subquadrate tubercles, each bearing one or more apical teeth and a plumose hair (Fig. 8). These marginal dentate tubercles become progressively more prominent toward the rear. Lateral margins of first 8 segments directed ventrally and produced posteriorly, bordered by stout spines. Ninth abdominal segment about twice as long as wide; widest at or just beyond base, basal half testaceous, much lighter than apical half; lateral borders extended posteriorly to form 2 prominent, acute apical teeth; without dorsal carina.

Ventral thoracic sclerites almost devoid of tubercles and setae except medially along posterior margin of mesothoracic and metathoracic sternites, where a few stout setae and flattened, apically dentate, tubercles occur. Abdominal sternites translucent, with sparsely scattered, flattened tubercles bearing serrate setae (Fig. 9); apical margins of the more posterior segments bearing flat, dentate tubercles. Abdominal segments 1-6 with pleura which are difficult to observe except in cleared specimens. The pleurites also translucent and with flattened tubercles bearing serrate setae; in addition, these tubercles bear bladder-like processes (Fig. 10). Pleurites 2-6 with a marginal lateral row of setae which are enlarged and spine-like, especially toward the posterior. Ninth abdominal segment with longer, slenderer setae; opercular claws slender.

SPECIMENS EXAMINED: MEXICO: Estado de Colima, La Estancia, 24-III-70, 13 larvae with 1 adult; San Cayetano, 24-III-70, 14 larvae with 24 adults; El Trapiche, 24-III-70, 8 larvae with 13 adults; El Cóbano, 25-III-70, 29 larvae with 261 adults; El Cóbano, 9-VIII-70, 4 larvae with 10 adults; Comala, 26-III-70, 6 larvae; Estado de Guerrero, Xaltianguis, 30-III-69, 69 larvae with 14 adults; El Ocotito, 2-IV-69, 4 larvae; Tierra Colorada, 2-IV-69, 2 larvae with 2 adults; Saucito, 4-IV-69, 29 larvae with 2 adults; El

Limon, 4-IV-69, 22 larvae with 23 adults; PANAMA: Provincia Coclé, Candelaria, 25-VI-68, 1 larva; Prov. Panamá, Pacora, 26-IV-68, 1 larva with 1 adult; VENEZUELA: Estado de Carabobo, Tocuyito, 1-VI-68, 1 larva with 2 adults. The description is based on specimens collected at Saucito, Guerrero, México.

ADDITIONAL RECORDS OF XENELMIS: Since *Xenelmis bufo* has previously been reported only from the Estado de México in México and 2 localities in Panamá (Volcan de Chiriquí and San Miguel, Pearl Island), the following additional adult records are presented: MEXICO: Estado de Chiapas, Rio Macuilapa, 2-XI-64, (1); N of Arriaga, 20-X-66, (1); Ixtapa, 4-XII-66, (12); Estado de Colima, Queseria, 25-III-70, (2); Montitlan, 9-VIII-70, (1); Estado de Guerrero, El Cuarenta y Cinco, 5-IV-69, (42); Estado de Jalisco, El Tule, 27-III-70, (9); 8 km S of Tecalitlan, 27-III-70, (2); Estado de Morelos, Rio de Chalma, 22-X-64, (1); GUATEMALA: Departamenta de Retalhuleu, 4 mi. W of Cuyotenango, 23-X-66, (1); Depta. Suchitepequez, ca. 30 mi. W of Escuintla, 24-X-66, (1); Depta. Guatemala, 20 km. NE of Guatemala City, 26-X-66, (2); Depta. Jutiapa, Jutiapa, 28-X-66, (1); NICARAGUA: Depta. Granada, E of Nandaime, 2-XI-66, (11); COSTA RICA: Depta. Puntarenas, Rio Jesus E of Esparta, 4-XI-66, (7); Canoas, 10-XI-66, (1); PANAMA: Chiriquí, Bambito, 23-VI-68, (1) [type locality]; Coclé, Machuca, 25-VI-68, (3); VENEZUELA: Cojedes, Tinaquillo, 1-VI-68, (2). All collections were made by the author.

ECOLOGY: All specimens were taken in relatively clear, shallow, fast-flowing water in gravelly areas or mixed sand and gravel, though in some the sand was preponderant. The streams ranged from small brooks to medium sized rivers. I have collected moderate numbers of adults in various localities during the autumn, without finding larvae. Perhaps they were not present at that season, but it is more likely that I simply missed them. As might be expected from their shape, the larvae, when taken in the net, curl up like tiny armadillos or pillbugs (isopod crustaceans), and readily fall through the mesh. Although I have not observed living larvae in the laboratory, I surmise that in nature the head is generally withdrawn beneath the carapace-like pronotum, and that the colorless, transparent anterolateral portions of the pronotum enable the larva to see reasonably well even when the head is thus protected.

ADDITION OF XENELMIS TO EXISTING KEYS:

The only comprehensive key to the larval elmids of Central and South America is that of Bertrand (1955). To insert the larva of *Xenelmis* into his key, the following changes may be made: On page 137, in couplet 52 (45), delete . . . "angles postérieurs des segments non prolongés . . ."; in couplet 55 (60), delete . . . "mésothorax et métathorax également à deux pièces."; following couplet 55 (60), insert a half-couplet as follows: 55a (69). Mésothorax et métathorax à deux pièces épipleurales. On page 138, at the end of the key, insert the following half-couplet: 69 (55a). Mésothorax et métathorax à trois épipleurales; angles postérieurs des segments de l'abdomen prolongés, les bords lateraux garnis des épines . . . *Xenelmis* Hinton.

To add *Xenelmis* to Hinton's key (1940), it is best to insert it in 2 places, since neither choice in the first couplet is quite appropriate and the reader might choose either. On page 229, after the second choice in couplet 2, replace the lead or guide numeral 3 with 2a and insert the following couplet:

2a. Lateral margins of thoracic and abdominal segments directed ventrally (vertically); body hemicylindrical but tapering. CENTRAL and SOUTH AMERICA .... *Xenelmis* Hinton (1936).
Lateral margins directed laterally (horizontally); body more flattened .... 3.

On page 230, after the second choice in couplet 11, delete "NORTH and SOUTH AMERICA . . . *Heterelmis* Sharp (1882)," replace it with the guide numeral 11a, and insert the folowing couplet:

11a. Procoxal cavities closed behind (prothorax with a median posterior sternite). NORTH and SOUTH AMERICA .... *Heterelmis* Sharp (1882).

Procoxal cavities open behind (prothorax without a median posterior sternite). CENTRAL and SOUTH AMERICA .... *Xenelmis* Hinton (1936).

The following additional corrections should be made to Hinton's key on p. 230: in the first part of couplet 8, replace "*Limnius* Er. (1847)" with *Oulimnius* Des Gozis (1886); to the first part of couplet 9, add WEST INDIES; in the second part of couplet 9, replace "BOLIVIA" with CENTRAL and SOUTH AMERICA; in the first part of couplet 13, replace "*Latelmis* Reitt. (1883)" with *Limnius* Illiger (1802).

ACKNOWLEDGMENTS

Fig. 2 and 3 are based on outline drawings made by my daughter, Mary Brown Catron, to whom I am indebted. Fig. 4-11 were inked by our departmental illustrator, Ginna Davidson, to whom I also express thanks.

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